

**Evaluating a Quality Improvement program for the Emergency Medical Service in
the Burnsville Fire Department**

Executive Development

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ABSTRACT

This applied research project evaluated the need for a formal quality improvement program for the Burnsville Fire Department. The problem was that the Burnsville Fire Department Emergency Medical Service (EMS) program did not have a formal quality improvement (QI) program in place, resulting in an inability to evaluate the delivery of EMS to the community. The purpose of this applied research project was to evaluate the need for a formal quality improvement program for the Burnsville Fire Department EMS program. Descriptive and evaluative research were employed to answer the following questions:

1. What are the benefits of a quality improvement program?
2. What are the common elements of a quality improvement program?
3. What requirements or industry standards are there for an EMS quality improvement program?
4. What are the current indicators of quality within the Burnsville Fire Department?

Procedures utilized in this research project were: a review of the literature, evaluation of existing research on the benefits and elements of quality improvement programs, evaluation of requirements and industry standards, and an evaluation of current quality indicators using an instrument developed by the researcher to assess documentation, and a review of advanced airway procedures.

Results showed benefits, as well as common elements of quality improvement programs. Five voluntary industry standards were described, and current indicators of quality were measured. Patient care reports were reviewed and documentation was found adequate in 86% of cases. Substandard care was documented in 11.6% of

cases. Advanced airway procedures were audited and results showed an overall success rate of 68.1%.

Recommendations resulting from this study were that the department should:

1. Implement a quality improvement program.
2. Establish a quality improvement team, made up of department members at all levels of the organization.
3. Utilize the National Highway Safety Administration *Leadership guide to quality improvement for emergency medical services systems* as a template for the quality improvement program.
4. The quality improvement team should continue to evaluate the current efforts such as accreditation, to ensure that efforts are not duplicated and that resources are being dedicated to appropriate efforts.

TABLE OF CONTENTS

Abstract	2
Table of Contents	4
List of Tables	5
Introduction	6
Background and significance	6
Literature Review	10
Procedures	19
Results	23
Discussion	27
Recommendations	29
References	31
Appendix A	35

LIST OF TABLES

Table

1	Run report documentation results	26
2	Endotracheal Intubation (ETI) procedure audit	26

INTRODUCTION

The problem is that the Burnsville Fire Department Emergency Medical Service (EMS) program does not currently have a formal quality improvement (QI) program in place, resulting in an inability to evaluate the delivery of EMS to the community. The purpose of this applied research project is to evaluate the need for a formal quality improvement program for the Burnsville Fire Department EMS program. Descriptive and evaluative research will be employed to answer the following questions:

1. What are the benefits of a quality improvement program?
2. What are the common elements of a quality improvement program?
3. What requirements or industry standards are there for an EMS quality improvement program?
4. What are the current indicators of quality within the Burnsville Fire Department?

BACKGROUND AND SIGNIFICANCE

The city of Burnsville has a population of 60,220 citizens (2000 U.S. Census) and is the 10th largest city in the State of Minnesota. The Burnsville Fire Department is the sole provider of Advanced Life Support (ALS) ambulance service to the community and has been responsible for EMS in the city since 1984. The department is a full-time, career fire department made up of 38 members and operates two ALS ambulances 24 hours per day, responding from two strategically located fire stations. The Operations division of the department is made up of 30 personnel, with a minimum daily staffing of eight personnel. Four of the minimum daily staff are paramedics assigned to two ambulances operating out of the two fire stations. The Fire Chief, contract Medical Director, an Operations Captain, Fire Marshal, Training Captain, three fire inspectors,

and a department secretary carry out the administrative functions of the department.

The fire department responds to approximately 2,000 requests for ambulance service each year, resulting in approximately 1,600 ambulance transports annually.

The Burnsville fire department is also the first fire department in the state of Minnesota to hold “accredited status” from the Commission on Fire Accreditation International (CFAI). According to the mission statement listed on the CFAI web-site,

The mission of the Commission on Fire Accreditation International is to assist the fire and emergency service agencies throughout the world in achieving excellence through self assessment and accreditation in order to provide continuous quality improvement and enhancement of service delivery to their communities. (CFAI, 2002).

Clearly, excellence is a part of the culture of the fire department; however the lack of a program to assess the quality of medical care provided to the community is an area needing to be addressed.

In the area of government services and the EMS industry specifically, there is an increasing demand for cost effective, efficient, and quality services. According to Wray & Hauer (1997), “...citizens have started to expect from public programs the kind of results and performance to which they have grown accustomed to [*sic*] in our consumer oriented society” (p.4). There is increasing pressure from within the department and from external sources such as elected and appointed government officials for the department to be able to justify and represent the services it provides to the community.

EMS calls currently account for approximately 60% of the requests for service from the fire department. The chief of the department, an administrative captain and a shift captain assigned to lead a committee of six department members manage the EMS program, in conjunction with the department medical director. The financial, legal,

customer service, and daily operations of the EMS program are managed with defined areas of responsibility and accountability. The actual medical guidelines utilized by the department paramedics are published patient care guidelines developed by the county EMS providers and approved by the department medical director.

The supervision of medical care is provided in a number of ways. The paramedic crews are supervised by the shift fire captain directly, however the captain may not be present on each call, depending on the severity, or due to other calls occurring at the same time. The receiving hospital emergency room physician also supervises medical care. Paramedics function under the autonomy of the department medical director under the standing order of the pre-approved patient care guidelines. As a back-up to standing orders or when further guidance is needed, the paramedics have the ability by phone or radio, to contact a physician in the hospital that will receive the patient for further medical direction. The Chief or one of the administrative captains handles complaints regarding customer service issues. Complaints regarding medical care are handled initially by the administrative staff, and then reviewed with the medical director for specific patient care issues. Follow up is provided on a case-by-case basis with the individual paramedics involved.

The fire department EMS program has an excellent reputation in the community. The city conducts a residential survey on a bi-annual basis regarding city services and, for the past several years, the fire department ambulance service has enjoyed a 90% or higher “good” or “excellent” rating from citizens, with a 98% “satisfied” rating from respondents that have utilized our services (Decision Resources, 2001, pp. 49, 94). Clearly, the customer satisfaction component of quality has been met, but the actual medical care has not been evaluated, with the exception of the rare complaint or incident. The current department situation does not allow the department to evaluate

the medical care provided to the community on a system-wide basis. There is no mechanism for the department to determine the appropriateness of medical care, the need for additional training, equipment or procedures without such review being motivated primarily by a complaint.

The uncertain future and difficult financial condition of government funding, declining healthcare reimbursement and the demand for effective and efficient government services all indicate a need for a method to evaluate the EMS program. Within the department, there are staff who are promoting the need for a program and there are those that are wanting to follow the old adage “if it isn’t broke, don’t fix it!”

This evaluation will be important to the department by providing an objective look at the benefits, elements, requirements, and current indicators of quality in the fire department EMS program, allowing the department to make an informed decision regarding the allocation of resources and the need for such a program. A quality improvement program for the EMS function of the fire department will most likely require time and financial resources to support it, if implemented. Prior to implementing this type of program, an informed decision should be made and the true need identified and understood.

This Applied Research Project (ARP) relates to the service quality module in the *Executive Development* course. The terminal objective of the module states “given a conceptual understanding of Total Quality Management and service quality principles, the students will be able to evaluate services provided by their organizations and develop strategies to improve organizational quality and service standards.” (National Fire Academy [NFA], 1998, p.10-2). This project relates to the United States Fire Administration operational goal “to promote within communities a comprehensive, multi-hazard risk reduction plan led by the fire service organization” (NFA, 2002, p. II-2) by

evaluating a potential element of that plan. EMS is 60% of the calls for service in the city of Burnsville and a quality improvement program may help improve service and reduce deaths from multiple hazards (preventable injuries, heart attacks, stroke trauma, etc.)

LITERATURE REVIEW

Benefits -

Numerous sources report that the main goal for any quality improvement program is quality care for the patient (Johnson, 1992, p. 11; Commission on Accreditation of Ambulance Services [CAAS], 1997, p. 143; McDowell, 1993, p. 14). O'Connor, Slovis, Hunt, Pirallo, & Sayre (2002) called for a system of audits and identification of benchmarks in order to improve patient safety and reduction of serious errors in EMS (p. 111). Additional benefits of a quality improvement program include reducing liability and improving employee morale (Cohn, 1998, p. 141).

The words of Chief Ron Coleman (1991) of the International Association of Fire Chiefs (IAFC) raise an important point in dealing with the quality improvement issue. "The better we are at quality control, the more likely we are to establish a higher level of competence in the public safety field" (p. 34). The benefit of a higher level of competence will allow the fire service to provide better and more efficient service to the public.

The US Fire Administration's *Implementation of EMS in the Fire Service* (1997) lists the purpose of QA as a means "to identify weaknesses and to create means of improvement" (p. 79-80). "QA has served as an effective problem-*identifying* mechanism in EMS. Analysis of problems and methods of problem *solving* are the emphasis of CQI" (McDowell, 1993, p. 23).

Joyce, Dutkowski and Hynes (1997) reported “a significant and sustained improvement in documentation and performance in an EMS system” in 13 of 19 parameters measured, with results sustained over a two-year period (p. 144). Joyce further concludes that the development of a quality improvement program involving an audit of patient care reports, feedback, and continuing education shows significant improvements in performance goals (p. 142, 143).

Clawson, Cady, Martin, and Sinclair (1998) reported a significant improvement in compliance with protocol in an urban emergency medical dispatch center, when a formal quality management process was in place. They concluded that an objective assessment of performance, along with continuous meaningful feedback enhanced dispatcher performance. Prior to implementing the quality management process, compliance to protocol was at an unacceptable level and in a three-month period, with performance feedback and continuing education based on quality reviews, compliance to protocols improved dramatically from 75% to 97.5% (p. 582).

Moore (1999) asserts, “emergency medical service quality measures are necessary to guide policy makers in critical decisions regarding system design and to safeguard against poor quality providers” (p. 330).

When addressing the subject of quality management for fire-based EMS systems, Arena (1997) concluded that “customer satisfaction is directly related to system quality” (p. 130) and that “EMS is indeed a prime area where quality management systems ... can truly make a difference in the overall image and efficiency of any fire/EMS service” (p. 2). Arena further documents achievement of a performance goal of reduced hospital “turnaround times” with a minimal financial burden (p. 27).

In summary, the most basic, yet powerful benefit of quality improvement is described by Moore (1999): “the essence of quality improvement is an organization-

wide focus on meeting the needs of those who use and/or pay for EMS services” (p.328). Clearly, quality improvement programs show several substantial benefits for the agencies and organizations that utilize them.

Elements -

In 1973, the Emergency Medical Services Systems Act identified 15 components of an EMS system, one of which was “System Review and Evaluation.” The focus of this component was more about data elements and demographic information than medical care provided (Johnson, 1992, p. 3). As EMS developed and modernized, Quality Assurance (QA) became more of a contemporary concept, with the belief in medicine that all treatments and interventions should be subject of review to ensure quality patient care.

Sobo, Andriese, Stoup, Morgan and Kurtin (2001) state that “guidelines for systematic evaluation of EMS performance do not exist (p. 138). Additionally, Sobo et al. found that in developing data element requirements for a quality improvement project, it was important to consider the local EMS providers protocols, definitions of data elements and use of the data in order for the data to be meaningful in quality improvement efforts (p.143). The study found that “because of variations across EMS systems, most indicators can only be devised at the local level. Further, the indicators traditionally suggested by government organizations are not necessarily the same as those that agency personnel see as crucial” (p. 153).

These findings support those of Greenberg et al. (1997), in that the local providers are in the best position to determine the quality elements that are of value in that EMS system (p. 25-26). The Greenberg study identified 18 different quality improvement elements, as proposed by front-line paramedics (p.24). From the perspective of the field providers, the quality elements differed from the traditional

approaches to quality improvement measures and were important for that particular EMS system (p. 26).

More traditional elements of quality improvement include those studied by Joyce, Dutkowski and Hynes (1997). A total of 19 parameters were evaluated for a two-year period. Time elements of response time, scene time, and transport times were studied. Patient assessments, such as chief complaint, mechanism of injury, history, vital signs, and physical examination were included in the quality improvement review. Protocol compliance, patient disposition and overall documentation were also included in the study (p. 141).

Stickle (2002) determined 16 quality improvement components utilized by other fire departments (p. 20). The top five components discovered in the study were protocol review, review and evaluation of run sheets, continuing education for personnel, mechanism to review new ideas/innovations, and report writing training (p. 20).

Holliman, Swope, Mauger, Wuerz, and Meador (1993) evaluated two different systems for conducting quality assurance review and identified parameters that were measured in both systems, including compliance with protocol, skills utilization, a summary of compliance to protocol, on-scene time intervals, and all refusal of care cases (p. 306).

David Garvin, in the Harvard Business School video series *Competing through quality* (1990), identifies eight dimensions of quality. The eight dimensions are (1) performance, (2) features, (3) reliability, (4) conformance, (5) durability, (6) serviceability, (7) aesthetics, and (8) perceived quality (segment two guide). Garvin contends that quality is defined from the customer's point of view and by evaluating quality in each, or any one, of the eight dimensions, "strategic options are made

available and differentiation of service can be made in one or all of the dimensions of quality” (tape one, segment two).

Moore (1999) proposes that efforts to assure quality in EMS systems should go beyond the traditional methods and establish measurable indicators or system performance elements of service quality (p. 325). The basic premise of this assertion is that “traditional quality assurance techniques used in prehospital emergency medicine are static and retrospective” (p. 326). Moore goes on to say, “performance measures will undoubtedly increase the likelihood of quality in EMS systems, recognizing that ‘you can’t improve what you don’t measure’” (p. 327) and “system evaluation is the essential process of assessing overall quality and effects of an EMS system” (p. 328). Quality performance indicators proposed by Moore include: call processing, turnout time, travel time, staffing, deployment, road structure coverage capability, patient care protocol compliance, patient outcome, defibrillation availability, extrication capability, employee illness and injury, employee turnover, quality program, system user opinion, and multi-casualty event response plan. (IAFF, 2001).

In summary, careful consideration of the elements of a quality improvement program must be done in respect to the value and importance to the local EMS system, usefulness to the provision of patient care and the measurement of system performance.

Requirements and industry standards –

Several organizations have established standards for quality improvement programs in EMS. These include federal agencies, private organizations and industry accreditation groups.

At the federal level, the National Highway Traffic Safety Administration (NHTSA) developed the *Leadership Guide to Quality Improvement for Emergency Medical*

Services (EMS) Systems in 1997 “as a template for EMS managers who want to establish and maintain a program for continuously monitoring and improving the quality of patient care and support services in all parts of the EMS system” (Martinez introduction letter). The NHTSA guide advocates utilizing a three-stage approach to implementation of QI. The three stages identified are building awareness at all levels of the organization, expanding workforce knowledge and fully integrating strategic quality planning and actions into daily operations (p.2). The guide uses the seven categories of the Malcolm Baldrige Quality program as a basis of the template. The seven categories are: Leadership, Information and Analysis, Strategic Quality Planning, Human Resources Development and Management, EMS Process Management, EMS System Results, and Satisfaction of Patients and other stakeholders (p.2-3). The implication of using the guide is not in following the steps to achieve an end product, rather, “the most important results for achievement are improved health of patients, improved quality of EMS services, and improved efficiency of resource use” (p.5).

In the State of Minnesota, the lead state agency for EMS is the Emergency Medical Services Regulatory Board (EMS RB). “The EMS RB has set April 1, 2003 as the implementation date by which all ambulance providers must be collecting and submitting data electronically to [the agency]” (EMS RB, 2003). The EMS RB program focuses on the collection of data about ambulance service provider activities in the state and does not have a quality improvement component.

A number of organizations have introduced voluntary standards in the fire and EMS industries to encourage quality improvement programs, as a component of a self-assessment, accreditation or a system evaluation process.

The International Association of Fire Fighters (IAFF) has developed an EMS System Performance Measurement Instrument to “provide evidence of the systems

value to the community” (p. 3). The instrument measures 15 indicators of quality in an EMS system. According to Lori Moore of the IAFF:

This is only a part of an overall QA/QI plan. There are three parts to an overall quality management plan:

1. TQM – buy in of the top management and the bottom up staff,
2. CQI – Continuous Quality Improvement – this is a comparison of a department against itself over time using system performance measures, and
3. QA – (not Quality Assurance, but Quality Assessment), this is a comparison of the department against a standard over time. (L. Moore, personal communication, December 20, 2002).

The Commission on Accreditation of Ambulance Services (CAAS) has produced a consensus based set of standards for ambulance services wishing to become accredited. According to the commission, “the intent of the CAAS Standards is to define a ‘gold standard’ for the medical transportation industry of a higher caliber than is typically required for state or local licensing” (CAAS, 2000, p. 1). In the CAAS standards, a quality improvement program is included as a key measurement of the clinical standards section. The standard states, “the agency shall have a comprehensive CQI program addressing clinical quality” (p. 9). The standard has six key characteristics for evaluation of the quality improvement effort (p. 9).

The Commission on Fire Accreditation International (CFAI) has also established quality improvement as an important component for the designation as an “accredited agency.” The self-assessment manual of the commission lists a quality improvement program under the EMS category as a “core criteria” or one that must be in place in order for the agency to achieve accredited status. The criterion simply reads “the

agency has a quality assurance program in place” (CFAI Self Assessment manual, 2000, p. 241).

The National Academy of Emergency Medical Dispatch (NAEMD) lists quality improvement measures as two of the 20 standards for awarding the designation of an “Accredited Center of Excellence” in emergency medical dispatching (Clawson and Dernoceur, 2001, A-3). The academy outlines a five-step process to developing a quality improvement program. The five steps are:

Step 1: Clearly define operational expectations,

Step 2: Train employees to meet or exceed the established standards,

Step 3: Use statistical processes to measure and improve individual and system performance,

Step 4: Re-train employees who are not meeting accepted standards,

Step 5: Implement a continuous improvement cycle (National Academy of Emergency Medical Dispatch, 2001, pp. 1.3, 1.4).

Current indicators of quality –

Limited literature exists for review on the Burnsville Fire Department, however; the Accreditation Report (Krakeel, 2000) of the peer assessment team that assessed the department contains several salient points. The team leader, Jack Krakeel, notes in the executive summary of the report,

The department is to be commended for its participation in this very comprehensive and detailed accreditation process. The benefits of the Self-Assessment process were evident as witnessed by the organization’s institution of numerous policy modifications and organizational efforts focused on improving the quality of the fire service delivery system and the community’s emergency services programs. (p. 6).

Krakeel further notes:

The Burnsville Fire Department is a dynamic and progressive agency. The department is to be commended for the inclusion and wide utilization of all organizational members in the preparation and implementation of organizational goals consistent with its mission and administrative mandates (p. 6).

The specific assessment of the department by the peer reviewers is pertinent to this applied research project. In the assessment of the EMS criteria, the reviewer comments:

The current information system provides sufficient and accurate data. Though the agency collects the data on a monthly basis, no month-to-month trend analysis is provided for review. Develop critical indicators of quality in the local system (i.e. vital sign compliance rate) and report on those indicators every month. Assimilate monthly reports into trend analysis charts and distribute those charts to field personnel and stations. Make incremental improvements and evaluate those improvements based on changes to the trend (p.17).

The specific recommendation relative to the quality program utilized by the department states:

The agency should consider adapting the current quality assurance program to select appropriate screens for review. Audit specific medical indicators on a per-person basis or according to the specific diagnosis. Make process changes to the EMS system based on information received from the review process. Adapt the training program to focus on system improvements and remedial training only when required (p. 17).

In summary, the literature review provided a comprehensive look at the topic of quality improvement. The review aided in identifying benefits, elements and standards relating to quality improvement. The literature review also influenced the researchers understanding of the topic and aided in clarification of the purpose of the project.

PROCEDURES

This applied research project employed descriptive and evaluative research methodologies to (a) describe the benefits of a quality improvement program, (b) identify the elements of a quality improvement program, (c) describe industry standards and requirements for a EMS quality improvement program and (d) evaluate current indicators of quality in the Burnsville Fire Department.

A literature search was completed at the National Fire Academy Learning Resource Center in Emmitsburg, MD. Additional literature searches were conducted at the Minnesota State Colleges and Universities (MnSCU) Fire/EMS Center in St. Paul, MN, and the University of Minnesota Bio-Medical library in Minneapolis.

An analysis of available research was conducted to determine the benefits and elements of an EMS quality improvement program. State EMS laws and agency rules were researched to determine the requirements for a quality improvement program. Several EMS and fire service industry standards were reviewed and evaluated including, the National Highway Traffic Safety Administration's *Leadership Guide to Quality Improvement for Emergency Medical Services (EMS) Systems*, the International Association of Fire Fighters *EMS System Performance Measurement Instrument*, the Commission on Accreditation of Ambulance Service standards, the Commission on Fire Accreditation International Standards, and the National Academy of Emergency Medical Dispatch standards.

To obtain information about the current quality indicators of the Burnsville Fire Department EMS, an evaluation was done on two elements. The researcher obtained an instrument from a local EMS program to evaluate the documentation of patient care reports and whether the care rendered met standards or was sub-standard. The evaluation tool was a Run Report Documentation Checklist (Appendix A) with a total of 20 points available for including the listed elements in the patient care report. Each patient care report in the sample was evaluated using this tool. A numerical score was obtained for each report, then a determination was made based on the documentation present, if the care rendered met the standard of care for that patient condition, was sub-standard or was unable to be determined due to insufficient documentation. A random sampling of EMS patient care reports was selected from a six-month period of time. A minimum of 25 reports were selected from each of the six months, ensuring that all practicing paramedics from the department had at least one patient care report evaluated per month. A total of 189 reports were evaluated. This represented approximately 15 % of the total reports for the period and was considered to be a random, representative sample. The sample size was selected based on standards from an EMS organization suggesting “the review process for emergency medical cases should include...a minimum of 3% of the total calls” (National Academy of Emergency Medical Dispatch, 2001, p. 1.4). Similar research studies have used a review of 6% of monthly patient care reports, with statistical validity of 95% (Joyce, et al., 1997).

All Endotracheal Intubation cases for a two-year period were evaluated, with the assistance of a staff member, to evaluate appropriateness of documentation as well as success rates. This procedure was chosen for audit due to the recognition of ETI as a potentially life saving medical intervention. Patient care reports for the two-year period were reviewed, and any case involving an ETI was reviewed. The reports were

evaluated for completeness of documentation, the number of attempts at the procedure, and the success rate. A total of 47 cases were reviewed, representing 100% of the Endotracheal Intubation cases for a two-year period. A two-year period was selected due to the lower number of cases in a single year. This sample size was representative of the total number of cases reported.

Assumptions and Limitations –

The scope of this research project is to evaluate the need for a formal quality improvement program for the Burnsville Fire Department EMS program. Financial reimbursement, collection rates, organizational structure as well as resource deployment and staffing may also be factors in addressing the quality of service to the community, however they are outside the scope of this evaluation.

This is a basic evaluation of two selected quality indicators. Further investigation and evaluation of clinical quality may be undertaken in a formal quality improvement program.

Additionally, the results of this study apply to the Burnsville Fire Department specifically and should not be generalized to the fire service at large.

Definition of terms -

Advanced Life Support (ALS). The level of emergency medical care provided by paramedics including medication administration, EKG monitoring, advanced airway and medical procedures.

CAAS. The Commission on Accreditation of Ambulance Services.

CFAI. Commission on Fire Accreditation International.

Emergency Medical Service (EMS) system. “A comprehensive, coordinated arrangement of health and safety resources designed to provide expedient care to victims of sudden illness and injury” (Sachs, 1999, p. 19).

Endotracheal Intubation (ETI). An advanced airway procedure where a tube is placed into the trachea to secure a patent air passage to the lungs. Considered to be a potentially life-saving skill.

IAFF. The International Association of Fire Fighters.

Malcolm Baldrige national Quality Award. “National award given to companies and businesses in recognition of their achievements in quality. The Award is managed by the US Department of Commerce’s National Institute of Standards and Technology” (NHTSA, p. 85).

Medical Director. Licensed physician responsible for medical oversight and management of patient care standards and continuing medical education of the ambulance service. Department paramedics operate under the license of the physician.

NAEMD. The National Academy of Emergency Medical Dispatch.

NHTSA. The National Highway Traffic Safety Administration. The lead federal agency for EMS programs.

Quality Assurance. “Retrospective review or inspection of services or processes that is intended to identify problems” (NHTSA, 1991, p. 85).

Quality Improvement (QI). “The continuous study and improvement of a process, system or organization” (NHTSA, 1997, p. 85).

Quality Indicator. “Characteristic of products, services, or processes that represent quality” (NHTSA, 2001, p. 85).

Quality Management (QM). “Actions taken to meet the needs and expectations of the public, including both the clinical quality of medical care and the citizen’s perception of that care. This extends the concept of quality beyond the traditional focus on clinical proficiency to include all aspects of care” (Sachs, 1999, pp. 135, 136).

RESULTS

Answers to research questions –

Research question 1. What are the benefits of a quality improvement program?

The research revealed several measurable benefits of a quality improvement program. Improved quality of patient care was listed in three research projects. Improved documentation of patient assessment in the areas of chief complaint, history, vital signs and physical exam exceeded performance goals in a major study (Joyce et al. 1997). Additional research revealed significantly improved compliance to pre-established protocols as the main benefit of a quality improvement program, based on feedback and continuing education (Clawson et al., 1998). Additional benefits reported include customer satisfaction and achievement of performance goals (Arena, 1997). One study reported a lower rate of public complaints when an agency utilized four or more quality improvement methods (Stickle, p. 20).

Evaluation of existing research reveals several measurable benefits from EMS quality improvement programs.

Research question 2. What are the elements of a quality improvement program?

The research showed that there are multiple elements of quality improvement programs in use. The major elements of quality improvement programs include: (a) patient care report review and evaluation (noted in five research studies reviewed) (b) protocol utilization and compliance review (reported in 4 studies), (c) time elements such as response times, scene times and hospital transport times (reported in four research studies), and (d) specific skill utilization review (noted in three studies).

The finding of two studies that local determination of the elements of a quality improvement program is important is also worth noting.

The Harvard Business School identifies eight components of quality:

1. Performance,
2. Features,
3. Reliability,
4. Conformance,
5. Durability,
6. Serviceability,
7. Aesthetics,
8. Perceived quality.

Research question 3. What requirements or industry standards are there for an EMS quality improvement program? Research of Minnesota Emergency Medical Services Regulatory Board, § Chapter 144E.265 (2002) revealed there is not any requirement for a quality improvement program. The only reference made in the agency rules for a quality improvement program is in the description of the responsibilities of the medical director. “The responsibilities of the medical director shall include, but are not limited to...participating in the development and operation of continuous quality improvement programs including but not limited to, case review and resolution of patient complaints.”

The research revealed that there are five available industry standards for quality improvement. The National Highway Traffic Safety Administration's *Leadership Guide to Quality Improvement for Emergency Medical Services (EMS) Systems*, the International Association of Fire Fighters *EMS System Performance Measurement Instrument*, the Commission on Accreditation of Ambulance Service standards, the Commission on Fire Accreditation International Standards, and the National Academy of Emergency Medical Dispatch standards all contain standards for quality improvement.

The NHTSA guide utilizes the categories of the Baldrige quality award as a template for quality improvement. The IAFF recommends system performance evaluation of 15 elements; the CAAS standards include a quality improvement component in the clinical standards component of their accreditation program. The CFAI standards list two quality improvement measurements as a part of the EMS evaluation for accreditation, and lastly, the NAEMD center of excellence criteria include a requirement for formal quality improvement program.

Research question 4. What are the current indicators of quality within the Burnsville Fire Department? “The Burnsville Fire Department is a dynamic and progressive agency” (Krakeel, 2000). The current indicators of quality within the Burnsville Fire Department include this outside assessment by the team leader of the accreditation site visit in 2000.

The results of the evaluation of the patient care reports reveals that in 189 reports, the average score achieved was 17.6 out of a possible 20 points. This represents an 88% compliance in documentation score.

In 164 (86.8%) of the patient reports, the care appeared to meet the standard of care for that patient condition. Of concern, is that in 22 (11.6%) of reports reviewed, based on the documentation present, the care appears to not meet the standard. In only 3 (1.6%) of the cases, was there insufficient documentation to make a determination.

Table 1 summarizes the determinations of care, based on documentation:

DETERMINATION	NUMBER	PERCENTAGE
Met Standard of care	164	86.8 %
Substandard	22	11.6 %
Undetermined	3	1.6 %
TOTAL	189	100 %

Table 1: Run report documentation results.

The results of the Endotracheal Intubation (ETI) procedure review revealed 47 patients with ETI attempted. The presenting problem requiring ETI included 24 cardiac arrest, 15 unresponsive medical, and 8 unresponsive trauma cases. The total number of attempts to achieve a successful procedure (proper placement of the ET) was 66. This represents an average of 2.1 attempts per successful intubation. Ultimately, 32 patients (68.1%) of patients had an advanced airway placed successfully. Table 2 summarizes the ETI review:

PRESENTING CONDITION	NUMBER	PERCENTAGE
Cardiac Arrest	24	51.1 %
Unresponsive Medical	15	31.9 %
Unresponsive Trauma	8	17.0 %
Total patients with ETI attempts	47	100 %
Total successful ETI	32	68.1 %

Table 2: Endotracheal Intubation (ETI) procedure audit.

The final review of the ETI procedure involved proper documentation of the procedure. In 47 attempts, proper documentation (person accomplishing procedure, indications and complications, results) was provided in only 14 of the cases. The remaining data was obtained by reading each individual patient care report when an ETI was noted.

DISCUSSION

This researcher believes the need for a formal quality improvement program has been adequately evaluated. The benefits of improved patient care; improved documentation, increased compliance to protocol, and continuing education for EMS personnel are needed to address the findings of the basic review of documentation and procedure audit in this study.

The fire department has an excellent reputation in the community (Decision Resources, 2001) and is committed to excellence (Krakeel, 2000). The department needs to take steps to ensure the reputation matches the quality of medical care provided. Research suggests “quality management, properly introduced, can have dramatically positive effects in any organization” (Arena, 1997, p. 20). Further research supports the evaluation of the importance of quality measures at a local level and their applicability to the local EMS system (Greenberg et al., 1997, p. 25, 26; Dahger, 1992, p. 72).

The medical care provided meets the standard of care in most instances. The number of times that documentation reflects sub-standard patient care represents an area of potential risk for the department. It may very well be that the actual care provided met the standard for the particular patient condition; however, the documentation reflects otherwise. This illustrates a need for more training on proper

documentation and a need for increased feedback to the department as a whole, and individual follow up to those staff members with sub-standard documentation.

Clawson (1998) found that compliance to protocol increased dramatically when performance feedback was provided, along with continuing education based on review of compliance with protocol. Clawson concluded that “the results of this study lead us to believe that a properly designed and uniformly applied QM process – one that includes quantification of compliance with the protocol and direct feedback...results in improved overall compliance with all components of ...protocol” (p. 582). Joyce, et al (1997) also concluded that ‘a quality improvement program can effect significant and sustained improvement in documentation and performance in an EMS system” (p. 140). These benefits are clearly needed in the Burnsville Fire Department.

There are multiple models in place to establish a quality improvement program. The department should evaluate the specific components of the different models and attempt to combine the process of self-assessment (CFAI), system evaluation and performance measurement (IAFF), and the clinical standards of the CAAS model. The EMS system will also benefit from the integration of the NAEMD quality review process to achieve a “Center of Excellence” designation for the EMS dispatch center.

This researcher supports the notion that “in order to achieve [a] level of excellence, an EMS system must establish standards and expectations of prehospital practice and monitor the care that is provided to patients in relation to those standards” (Taigman, 1992, p. 65). If EMS is truly a system in the city of Burnsville, then a system must be in place to monitor, evaluate, and improve the delivery of emergency medical services.

The NHTSA guide will provide an excellent template to the overall quality management effort. The leadership component will be critical in creating and

maintaining an organizational focus on any quality improvement system that is developed. "Design and implementation of any quality program must involve the participation of those people affected by it" (Taigman, p. 70). "Perhaps the approach necessary to achieve a high level of quality is simply a careful blend of [all] concepts" (Taigman, p. 70).

RECOMMENDATIONS

Recommendation 1. The Burnsville Fire Department should implement a quality improvement program. The benefits of quality improvement indicate that it is a worthy investment of resources.

Recommendation 2. The Burnsville Fire Department should establish a quality improvement team, made up of department members at all levels of the organization. The department should also develop a mechanism to continue to evaluate customer satisfaction and expectations. Servicing the needs and expectations of the customer should be a key goal of the program. Determining those needs and expectations should be a priority.

Recommendation 3. The Burnsville Fire Department should utilize the National Highway Safety Administration *Leadership guide to quality improvement for emergency medical services systems* as a template for the quality improvement program. The CAAS clinical standard, the NAEMD standards, and the IAFF performance evaluation can serve as specific quality measurements and provide the quality indicators to be evaluated, in conjunction with the input of internal and external sources.

Recommendation 4. The quality improvement team should continue to evaluate the current efforts such as accreditation, to ensure that efforts are not duplicated and that resources are being dedicated to appropriate efforts.

It is clear to this researcher that a formal quality improvement program will benefit the Burnsville Fire Department. In an effort towards continuous improvement, future research should be done to link quality improvement efforts to patient outcome.

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APPENDIX A

Run Report Documentation Checklist

<u>Category</u>	<u>Possible Points</u>	<u>Points Awarded</u>
Demographic information (Name, run #, location, destination, crew, etc.)	1	
Legibility/spelling	1	
Chief Complaint listed	1	
History of present illness and/or mechanism of injury	1	
Past medical history	1	
Medications	1	
Allergies	1	
Initial (primary) survey (LOC, airway, breathing, circulation, disability)	2	
Focused (secondary) survey (head to toe examination)	2	
Pertinent negatives	1	
Proper treatment documentation	2	
Response to treatment/changes enroute	1	
One complete set of vital signs (time, BP, pulse, resp, oximetry)	1	
Glasgow coma score	1	
Author signature (must be paramedic if ALS care delivered)	1	
Information located in correct areas of form	1	
Times	1	
Total	20	

Note. From Regions Hospital EMS program, St. Paul, MN. Copyright 1998. Used and adapted with permission.

Based on documentation, care/treatment appears to be:

_____ Met Standard of care

_____ Substandard

_____ Unable to determine (insufficient documentation)